

**ANNUAL REPORT  
TO THE NEW JERSEY PINELANDS COMMISSION**

**ALTERNATE DESIGN TREATMENT SYSTEMS PILOT  
PROGRAM**

**August 5, 2005**



**The Pinelands Commission**

## **Background**

The Federal and New Jersey Pinelands statutes call for the preservation, protection and enhancement of the unique Pinelands ecosystem and its land and water resources. The exceptional quality of Pinelands water resources are protected and maintained through the control of development and other land uses and through close cooperation and coordination between local, state and federal agencies. To safeguard Pinelands water resources, the water quality provisions of the Pinelands Comprehensive Management Plan (CMP) focus on controlling the amount of nitrogen that enters the environment. Nitrogen is a significant point and nonpoint source pollutant due to its role in the eutrophication of surface water bodies. It is a useful indicator of overall Pinelands water quality and ecosystem health because it is naturally present in very low concentrations in the Pinelands environment.

The Commission's land use program discourages development in important ecological and agricultural areas while directing growth towards more suitable areas. While some of the designated growth areas are served by central sewer systems, others are not. In these unsewered growth areas, municipalities may zone for residential development on lots as small as one acre. One acre lots are also permitted in non-growth areas if certain cultural housing and grand fathered ownership conditions are met. In very limited instances, waivers of strict compliance allow for development of unsewered dwellings on lots as small as 20,000 square feet.

The water quality standards of the CMP permit the use of on-site septic systems (individual subsurface sewage disposal systems) provided that the design of the system and the size of the parcel on which the system is located will ensure that the concentration of nitrogen in the ground water exiting the parcel or entering a surface water body will meet the Commission's water quality standard of two parts per million (ppm). The CMP utilizes the Pinelands Septic Dilution Model to calculate nitrogen loading to groundwater from septic systems and to confirm that proposed loadings do not exceed the assimilative capacity of the environment. When standard values for home occupancy, wastewater volume, wastewater strength and rainfall infiltration are used in solving the model, the model calculates that a minimum 3.2 acre parcel is required to dilute nitrogen to the required 2 ppm concentration when conventional septic system technology is used. Conventional septic system technology, typically consisting of a septic tank and effluent dispersal field (and sometimes a pump and dosing tank) is ineffective at removing or attenuating nitrogen levels in wastewater. Thus, unsewered residential development using standard (conventional) septic system technology is permitted only on minimum 3.2 acre parcels.

In order to comply with the Pinelands water quality standard, unsewered residential development on parcels smaller than 3.2 acres requires the use of advanced onsite denitrifying wastewater treatment technology. If the mass of nitrogen contained in the wastewater discharged from an on-site septic system is sufficiently reduced through the use of an advanced treatment system, the CMP allows the minimum lot size required to meet the 2 mg/l property line concentration to be reduced from 3.2 acres down to a minimum of 1.0 acre.

The basic principles of biological nitrogen reduction in wastewater are well documented in the engineering literature. In fact, biological nitrification and denitrification is now routinely employed at large centralized sewage treatment plants, especially those that discharge treated effluent to environmentally sensitive receiving waters. These large scale treatment facilities utilize professionally trained and licensed operators and have the ability to enhance nitrogen removal through the use of chemical feed equipment and to make real time process modifications in response to changing influent wastewater characteristics.

The use of biological denitrification technologies at the much smaller scale of individual onsite systems is a relatively recent development. The US EPA as well as number of individual states and regions have developed and are currently administering programs to study the effectiveness of onsite wastewater denitrification treatment

technologies. The Ad Hoc Committee On Alternative Septic Systems, convened by the Pinelands Commission in March 2000, conducted a thorough review of this ongoing work to evaluate alternate treatment technologies nationwide, consulted with officials from other state and university programs involved with advanced on-site septic system technologies and management strategies, retained a consultant to assess the technical performance of selected technologies, met with treatment system manufacturers and county health officials, and coordinated research efforts with the New Jersey Department of Environmental Protection (NJDEP). After completing this extensive research, the Committee recommended the establishment of a pilot program to test five specific onsite wastewater treatment systems. The Alternative Design Wastewater Treatment Systems Pilot Program contained in the CMP (N.J.A.C. 7:50-10.21) is authorized as a means to test whether these systems can be operated and maintained so as to meet the water quality standards contained in the CMP with maintenance requirements that a homeowner can be reasonably be expected to follow.

Significant dates pertaining to the pilot program are as follows:

- |                  |   |
|------------------|---|
| August 5, 2002   | Effective date of the pilot program; residential applications received after this date for lots less than 3.2 acres that are not served by public sewer are required to use a Pinelands alternate design wastewater treatment system. Completed applications received prior to this date may use a pressure dosing septic system, subject to additional time constraints.   |
| January 10, 2003 | Copies of sample ordinances provided to Pinelands area municipalities with correspondence requesting timely municipal adoption.   |
| July 5, 2003     | Start of semi-annual reporting requirement for each manufacturer of an alternate technology treatment system to submit to the Executive Director a report which includes the number of systems installed during the previous six months and since the beginning of the pilot program, a discussion of any installation problems and what has been done to address those problems, an analysis and evaluation of the monitoring results to date and a discussion of any operational or maintenance issues, including the number of systems requiring maintenance or repairs and the nature and success of such maintenance and repairs, and the number of times the automatic dialing alarm system was set off and the reasons for each such occurrence. |
| August 5, 2003   | For completed applications received prior to August 5, 2002, last day to obtain design plan approval from a local/county health department for a pressure dosing septic system.   |
| August 5, 2004   | Last day to complete the installation of a pressure dosing septic system for those plans approved prior to August 5, 2003.  |
| August 5, 2006   | Executive Director to review the pilot program and report to the Commission within three months of this date on the implementation of the program. This report is to address nitrogen removal efficiencies of the treatment technologies, maintenance requirements, cost, frequency of system problems, an evaluation of the number of systems installed and a determination as to the adequacy of that number to render a final determination on the effectiveness of the treatment technologies in meeting the purposes and objectives of the State and Federal Pinelands Acts.   |
| August 5, 2007   | Last day to install a Pinelands alternate design wastewater treatment system unless a rule has been adopted which expressly authorizes such installations. (Note: Systems installed   |

on or prior to this date will be subject to the three year wastewater monitoring requirement, through August 5, 2010, and a five year warranty, and five year service contract, through August 5, 2012).

## **Introduction**

Amendments to the CMP establishing the Pinelands Alternate Design Wastewater Treatment System Pilot Program became effective on August 5, 2002. The rule requires that the Executive Director submit an annual report to the Commission describing activity to date on the installation, maintenance and performance data for each alternate design wastewater treatment technology. This third annual report is submitted to fulfill the annual reporting requirement to the Commission on the status of the Pinelands Pilot Program for Alternate Design Wastewater Treatment Systems.

Before any of the five alternative technology systems could be used within the Pinelands, the manufacturer of the alternate design treatment system must have submitted and the Executive Director must have approved detailed engineering design plans and system specifications, details on the automatic alarm dialing system, a wastewater sampling protocol, an operation and maintenance manual, a sample five year warranty, a sample five year operation and maintenance contract, and a sample deed notice.

Use of the alternative onsite wastewater treatment systems are authorized only in those municipalities which have adopted an ordinance that provides for the use of such systems and where the ordinance has been certified by the Commission.

The CMP also requires that each technology manufacturer or its agent submit a semi-annual report to the Executive Director which includes information on the number of systems installed, a discussion on the installation of systems, an analysis and evaluation of wastewater monitoring results to date, and a discussion of any operational or maintenance issues experienced.

## **Summary of Program Activity**

Alternative systems are authorized for use only in those municipalities which have adopted an ordinance to implement the pilot program. Those ordinances must then be certified by the Commission pursuant to N.J.A.C. 7:50-3. To assist the municipalities in this process, pilot program ordinances were developed by the Land Use and Technology Office and provided to the 40 Pinelands municipalities in which alternative systems could be used based upon existing zoning. To date, implementing ordinances have been adopted and the Commission has certified ordinances to implement use of the pilot program systems in 34 municipalities.

Commission staff is currently faced with the challenge of effectuating ordinance adoption in the remaining six, non-adopting Pinelands municipalities. While non-adoption by some municipalities is likely to have little impact due to the limited number of parcels that are zoned for unsewered development in those towns, significant consequences are possible in at least two municipalities, Egg Harbor Township and Southampton Township. In these two municipalities, the owners of unsewered parcels smaller than 3.2 acres cannot develop those parcels, even as otherwise permitted by zoning and other land use requirements, due to the municipal governing body's failure to adopt the requisite ordinance. The Commission staff continues to monitor the impact of non-adoption and will continue to work with the Deputy Attorney General in evaluating potential solutions to the municipal non-adoption issue. The following provides the status of municipal ordinance adoption as of August 5, 2005:

Status of Municipal Ordinances for Alternate Design Treatment System Pilot Program

*Certified*

Barnegat  
Bass River  
Berlin Township  
Buena Borough  
Buena Vista  
Chesilhurst  
Dennis  
Egg Harbor City  
Estell Manor  
Evesham  
Folsom  
Franklin  
Galloway  
Hamilton  
Hammonton  
Jackson  
Lacey  
Manchester  
Maurice River  
Medford  
Monroe  
Mullica  
Ocean  
Pemberton  
Shamong  
Stafford  
Tabernacle  
Upper  
Washington  
Waterford  
Weymouth  
Winslow  
Woodbine  
Woodland

*No Adopted Ordinance Yet*

Berkeley  
Egg Harbor Township  
Little Egg Harbor  
Plumsted  
Port Republic  
Southampton

The NJDEP has actively participated in the development of the Commission's pilot program. To expedite the approval of the Pinelands pilot program alternate design septic systems, NJDEP issued a Generic Treatment Works Approval (TWA) Permit which allows the use of the five Pinelands pilot program systems without individual applicants being subject to the standard \$450 NJDEP permit fee or 90 day review period. The expedited NJDEP Generic TWA Permit has been well received by both the regulatory and development community. It has proven to be an effective instrument allowing individual applications to be approved directly by the Pinelands county health departments bringing significant time and expense savings to the applicants.

To further facilitate implementation of the pilot program and to assist the Pinelands Area health departments in the review of plans and applications and the inspection of alternative treatment systems, Commission staff coordinated two field training sessions, one for the Amphidrome system and one for the Cromaglass system. Both sessions were well attended by county health department and NJDEP staff. Staff is currently coordinating field training sessions for the other alternative technology systems. In addition, Commission staff presented information on the Pinelands pilot program in May 2005 at the Onsite Wastewater Treatment Seminar held at Cook College. The onsite wastewater seminar was attended by engineers, builders and public health officials. Pinelands staff continues to work with the Pinelands county health departments to facilitate the review and approval of the pilot program technologies. Additionally, Commission staff is available to provide assistance to homeowners, builders, developers and consulting engineers in complying with the requirements of the pilot program.

The Alternate Design Treatment Systems Pilot Program provided for the phasing out of new pressure dosing system installations by limiting their construction beyond August 5, 2004. Twenty four (24) Pinelands alternate design treatment systems have been installed and activated to date, with the first system coming online in April 2004. This report will summarize information pertaining to the installation of these twenty-four (24) systems. The pilot program permits the alternative systems to undergo a three month start-up and stabilization period, subsequent to each home's initial occupancy date to allow microbial populations to develop. There is therefore no monitoring data at this time for the newly installed systems.

For summary purposes, the five Pinelands alternate design pilot program systems are:

1. Ashco RFS<sup>III</sup>
2. Amphidrome
3. Bioclere
4. Cromaglass
5. FAST

In accordance with the provisions of the pilot program requirements, prior to being certified for use, the manufacturer of each alternate design treatment system had to submit specific documents to the Executive Director for review and approval.

Ashco-A-Corporation provided the required documentation and based upon a detailed review by Commission staff, the Executive Director approved the Ashco RFS<sup>III</sup> Gravity system effective May 15, 2003 and the Ashco RFS<sup>III</sup> Gravity Dosing system effective July 24, 2003. Based upon the Pinelands Septic Dilution Model, the pilot program provides that each Ashco RFS<sup>III</sup> system shall be located on a parcel containing at least 1.5 acres for each dwelling unit that will be served by the system.

F.R Mahony & Associates, the manufacturer of the Amphidrome system provided the required documentation and, based upon a detailed review by Commission staff, the Executive Director approved the single family Amphidrome system effective July 24, 2003. Based upon the Pinelands Septic Dilution Model, the pilot program provides that

each Amphidrome system shall be located on a parcel containing at least one acre for each dwelling unit that will be served by the system.

Aquapoint, Inc., the manufacturer of the Bioclere system provided the required documentation and, based upon a detailed review by Commission staff, the Executive Director approved the single family Bioclere system effective November 18, 2003. Based upon the Pinelands Septic Dilution Model, the pilot program provides that each Bioclere system shall be located on a parcel containing at least one acre for each dwelling unit that will be served by the system.

Cromaglass, Inc., the manufacturer of the Cromaglass system provided the required documentation and, based upon a detailed review by Commission staff, the Executive Director approved the Cromaglass system effective December 29, 2004. Based upon the Pinelands Septic Dilution Model, the pilot program provides that each Cromaglass system shall be located on a parcel containing at least one acre for each dwelling unit that will be served by the system.

Bio-Microbics, Inc., the manufacturer of the FAST system provided the required documentation and, based upon a detailed review by Commission staff, the Executive Director approved the FAST system effective June 9, 2005. Based upon the Pinelands Septic Dilution Model, the pilot program provides that each FAST system shall be located on a parcel containing at least one acre for each dwelling unit that will be served by the system.

### **Installation Summary**

The first Pinelands alternative wastewater treatment system was installed on March 11, 2004 and brought online in April 2004. The manufacturer of that system, F.R. Mahony & Associates, agreed to use this installation as a training opportunity for representatives of the Pinelands area health departments. Training in the operation and installation of the Amphidrome system was provided by two engineers and two field service technicians from F.R. Mahony Associates. Many of the Pinelands area health departments (and several non-Pinelands area health departments) participated in this field training exercise.

A total of seventeen (17) single family Amphidrome wastewater treatment systems have been installed and brought on-line to date. F.R. Mahony Associates reports that an additional four (4) systems are presently being installed, bringing the total number of Amphidrome systems sold for use in the Pinelands to twenty-one (21). Nine (9) of the systems are located in Hamilton Township, Atlantic County, three (3) are located in Tabernacle Township, Burlington County, and one (1) each are located in Franklin Township, Gloucester County, Lacey Township, Ocean County, Pemberton Township, Burlington County and Mullica Township and Folsom Borough, in Atlantic County.

A total of five (5) Cromaglass systems have been installed and brought on-line to date. The manufacturer of the Cromaglass system, Cromaglass Corporation reports that an additional three (3) systems are presently being installed, bringing the total number of Cromaglass systems sold for use in the Pinelands to eight (8). Two (2) of the systems are located in Manchester Township, Ocean County, two (2) of the systems are located in Pemberton Township, Burlington County, and one (1) system is located in Hamilton Township, Atlantic County.

A total of two (2) Bioclere systems have been installed and brought on-line to date. One (1) Bioclere system is located in Tabernacle Township, Burlington County and one is located in Hamilton Township, Atlantic County.

There are no Ashco RFS<sup>III</sup> or FAST treatment technologies installed in the Pinelands to date.

In total, twenty four (24) Pinelands alternate design treatment systems have been installed and activated to date.

## **System Permitting and Local Approvals**

The pilot program relies upon the cooperation of local construction code officials, county health officials, alternate system manufacturers, certifying engineers and Pinelands staff to coordinate the approval of wastewater system engineering plans, the issuance of building permits, the approval of wastewater system installations and the issuance of certificates to occupy residences served by the alternative onsite treatment technologies. Prior to any Pinelands alternative treatment system being issued a final operational approval, the Pinelands area health departments and the Pinelands Commission are to receive an executed five year maintenance contract, five year warranty, three year wastewater sample and analysis protocol, deed notice, as-built plan and construction certification from the technology manufacturer and the NJ licensed engineer of record. While these documents have been received in the majority of cases, there have been several instances of certificates of occupancy being issued prior to all required documentation being received by the health departments and the Pinelands Commission. In these cases, Pinelands staff has had to work with the technology vendors, homeowners and agency officials to obtain the needed documentation after the fact, often a difficult and time consuming task. Pinelands staff will continue to work with the local agencies to educate them on the importance of assuring that all necessary documents are on file before issuing local approvals for home occupancy. This issue will need to be carefully evaluated and addressed in the forthcoming development of institutional arrangements for the long term management of alternate wastewater treatment technologies in the Pinelands.

## **Maintenance Summary**

In 2004, the manufacturer of the Amphidrome system, F.R. Mahony Associates reported that during the installation and start-up of one of the seven Amphidrome systems installed that year, a minor problem was detected involving the operation of a process blower and wiring to the blower. The problem was immediately corrected.

In 2005, F.R. Mahony Associates reported eight repair/maintenance actions. On one Amphidrome unit, F.R. Mahony reports that after start-up and during a routine system inspection, low liquid levels were noted in the clear well component. Subsequent investigation undertaken by F.R. Mahony technicians and the installation contractor detected an effluent leak in the system that was repaired by the installation contractor. To prevent similar leaks in future installations, F.R. Mahony reports that a boot-type gasket is now being used at all tank connection points. On a separate installation, F.R. Mahony alerted Commission staff to a problem related to the placement of the equipment control panel located inside a locked garage at one system location. F.R. Mahony technicians were temporarily unable to access the control panel to make process adjustments. A remote access device was subsequently installed outside the residence to permit the technicians to make process control adjustments without the need to access the interior control panel. F.R. Mahony reports that all future installations will employ remote access capability to avoid a similar problem. F.R. Mahony reported that odor complaints were received from one system owner. Reportedly, during system installation, F.R. Mahony recommended that the system be vented to the leach field; however, the installation contractor reportedly elected to vent the system to the atmosphere next to the Amphidrome reactor. To resolve the issue, Amphidrome recommended that the vent be redirected, either to the leach field as originally recommended or to a relatively remote location and equipped with an odor control device. F.R. Mahony reports that the vent was relocated away from the residence and that an odor control filter was installed. These measures have reportedly corrected the odor problems. Lastly, F.R. Mahony has reported on a number of process control adjustments to maximize treatment system efficiencies in order to meet total nitrogen discharge targets. None of the Amphidrome alarm/malfunction conditions resulted in an overflow condition and thus did not constitute a condition of public health significance.

In 2005, the manufacturer of the Cromaglass system reported three repair/maintenance actions. One was related to a splice in telephone wiring reportedly supplied by the builder that was causing interruption of telephone service. The

spliced wire and autodialer were replaced by the Cromaglass service agent to correct the problem. A local visual alarm was activated at a second Cromaglass installation resulting in a technician being dispatched to the site. The Cromaglass technician determined that a high energy surge, possibly the result of a lightning strike, had caused an electronic system failure. The system was reportedly repaired and retested and found to be ready for continued use. A third maintenance action was necessitated on a different Cromaglass system by a central station test timer failure. The Cromaglass service technician was dispatched and found the system to be non-operational, reportedly due to a high energy surge, again, possibly a lightning strike. The system was reportedly repaired and retested and found to be ready for continued use. None of the Cromaglass alarm/malfunction conditions resulted in an overflow condition and thus did not constitute a condition of public health significance.

In 2005, the manufacturer of the Bioclere system reported one repair/maintenance action. The problem was reportedly related to a power surge caused by a lightning strike. Aquapoint's service technician reportedly responded to the alarm condition and made the necessary repairs. The system has reportedly been retested and found to be ready for continued use. The Bioclere alarm/malfunction condition did not result in an overflow condition and thus did not constitute a condition of public health significance.

It appears that the provisions in the CMP which require an autodialer alarm coupled with the NJDEP requirement for a local audio/visual alarm have been effective at identifying system conditions that require responses from the service providers to evaluate systems and make repairs as necessary.

### **Cost Summary**

An integral component of the pilot program is the monitoring by the Commission of treatment system costs. To facilitate the Commission's monitoring of these costs, the CMP requires the manufacturer of the treatment technologies to report on the cost of installation of each individual system.

It should be noted that the total cost of an onsite wastewater treatment system consists of at least three separate costs, those being the cost of the alternative treatment unit and 5 year service package, the cost of the soil absorption system, and the cost of engineering services. The manufacturers of the treatment technologies have direct knowledge of the cost of their equipment and related support services, which in the case of the Pinelands pilot program includes a five year maintenance contract, five year warranty, and three years of quarterly effluent analysis. The manufacturers, however, do not have direct involvement in the installation of the soil absorption field, or the local engineering of the system including soil testing, design services, as-built plans, etc.

The alternate treatment system technology vendors are assisting the Commission in compiling system cost information including the cost of non-vendor supplied materials and services. This has enabled the Commission to identify the cost of the treatment technology (and the technology manufacturers support services) and the cost of engineering, soil absorption field installation, etc.

The following summary of alternate design treatment system costs is based upon information provided to the Commission by the system vendors, as supplemented by local home builders. It should be noted that costs may come down over time for a number of reasons. Prior experience with pressure dosing systems was such that, as engineers and installers became more familiar with pressure dosing technology after its original introduction in NJ in the late 1980's, both design and installation costs decreased. NJDEP has indicated that a reduction in the minimum required soil absorption field size has scientific merit due to the high quality effluent produced by these systems and that future revisions to the State's septic design standards may incorporate reduced field sizes. Lastly, future costs of replacing failed soil absorption fields may be saved in entirety as a result of the approximately 98 % removal of total suspended solids and biochemical oxygen demand that accounts for premature failure of absorption fields receiving only primary treated wastewater, as discharged by conventional septic systems.

<b>Name of Treatment System Technology</b>	<b>No. of Systems Evaluated for this Report</b>	<b>Average Reported Cost per Treatment Unit and 5 year service package *</b>	<b>Average Reported Cost for Engineering, Soil Absorption Field Installation, etc. **</b>	<b>Average Reported Overall Cost of the Advanced Onsite Treatment Systems</b>
Amphidrome	14	\$ 18,369	\$ 13,184	\$ 31,553
Bioclere	2	\$ 16,000	\$11,675	\$ 27, 675
Cromaglass	3	\$18,369	\$16,695	\$ 35,064

**Table 1. Average Total Cost of Pinelands Alternate Design Wastewater Treatment Systems** Note: Cost information is derived from a variety of sources and should be considered to represent approximate cost estimates.

\* Cost of the Amphidrome Treatment Unit as sold by F.R. Mahony, Associates including hardware and equipment, 5 year annual maintenance contract, 5 year warranty, 3 years quarterly effluent analysis, annual pumping of 2000 gallon anoxic tank for 5 years, and delivery of equipment to job site is \$ 14,355. In addition, the average cost of concrete tankage (2000 gal. concrete anoxic tank, concrete reactor vessel and 1000 gal. concrete clearwell), purchased separately from local suppliers, including delivery to the job site, is variable depending on precast supplier and distance to shipping location.

\* Cost of the Aquapoint treatment unit as sold by Aquapoint, including hardware and equipment, 5 year annual maintenance contract, 5 year warranty, 3 years quarterly effluent analysis, annual pumping of 2000 gallon anoxic tank for 5 years, and delivery of equipment to job site is approximately \$ 16,000.

\* Cost of the Cromaglass treatment unit as sold by Cromaglass Corp., including hardware and equipment, 5 year annual maintenance contract, 5 year warranty, 3 years quarterly effluent analysis, annual pumping of anoxic tank for 5 years, and delivery of equipment to job site is approximately \$18,369

\*\* Costs include determination of soil and site suitability (soil logs and “perc” tests), preparation of engineering plans, completion of NJDEP standard application forms, excavation for soil absorption system and tank placement, soil absorption system materials (suitable “K4” replacement soil, stone filter materials and lateral piping, or gravel free chambers, geotextile fabric), installation of all components, electrical connections, surveyor services, as-built plans, engineering construction observation and engineering certifications.

Commission staff is currently working to obtain cost information for the remaining five (5) Pinelands alternate design treatment systems that have been installed and activated but are not included in the cost summary table above.

### **Treatment System Nitrogen Attenuation Summary**

The pilot program requires that the technology vendors arrange for samples of treated effluent to be collected from each system on at least a quarterly basis (approximately every ninety (90) days) for at least three (3) years for a total of at least twelve (12) samples per system. Pursuant to the pilot program sampling and testing protocols, samples of treated effluent are collected from a sample collection port located between the treatment unit and the soil dispersal

field. Sample procurement is to comply with the NJDEP Field Sampling Procedures Manual (May 1992), as amended, and analysis of effluent samples is to be performed by laboratories certified by the NJDEP employing analytical methodologies approved by NJDEP. To permit the establishment of biological cultures necessary for treatment process to develop and stabilize, no samples are required during the first ninety days from system start-up. In some instances, technology vendors have permitted the interval between sample collection to exceed the 90 day maximum and Commission staff continues to stress the importance of strict compliance with this and all other provisions of the pilot program rules. If it is determined that a manufacturer or its agent is not adhering to any of the requirements of the pilot program, N.J.A.C. 7:50-10.22(a)5 provides a mechanism for the Commission to make a determination that the proposed future use of a technology raises a substantial issue requiring a hearing pursuant to N.J.A.C. 7:50-4.31 through 4.42. In the event that persistent and substantial non-compliance with the requirements of the pilot program becomes problematic, Commission staff will recommend to the Commission that the substantial issue determination be made.

As discussed previously, there are a total of twenty four (24) Pinelands alternate design wastewater treatment systems installed and activated to date. Laboratory data for system performance are still limited at this time due in part to the relatively small number of systems that are operating, the limited number of systems representing each specific technology, and the lag time between the initiation of the pilot program (February 5, 2002) and the date that the first alternative technology system was activated (April 2004).

Sample results have been submitted for twelve Amphidrome systems to date. One of these systems has had five (5) analyses performed, four of the systems have had four (4) analyses performed, three of the systems have had three (3) analyses performed, one system has had two (2) analyses performed, and three systems have had one (1) analysis performed. A total of thirty five (35) samples have been taken from the twelve (12) Amphidrome systems. Sample results have been submitted for two Bioclere systems, with each Bioclere system having been sampled only once. Only one sample result has been submitted for one Cromaglass system.

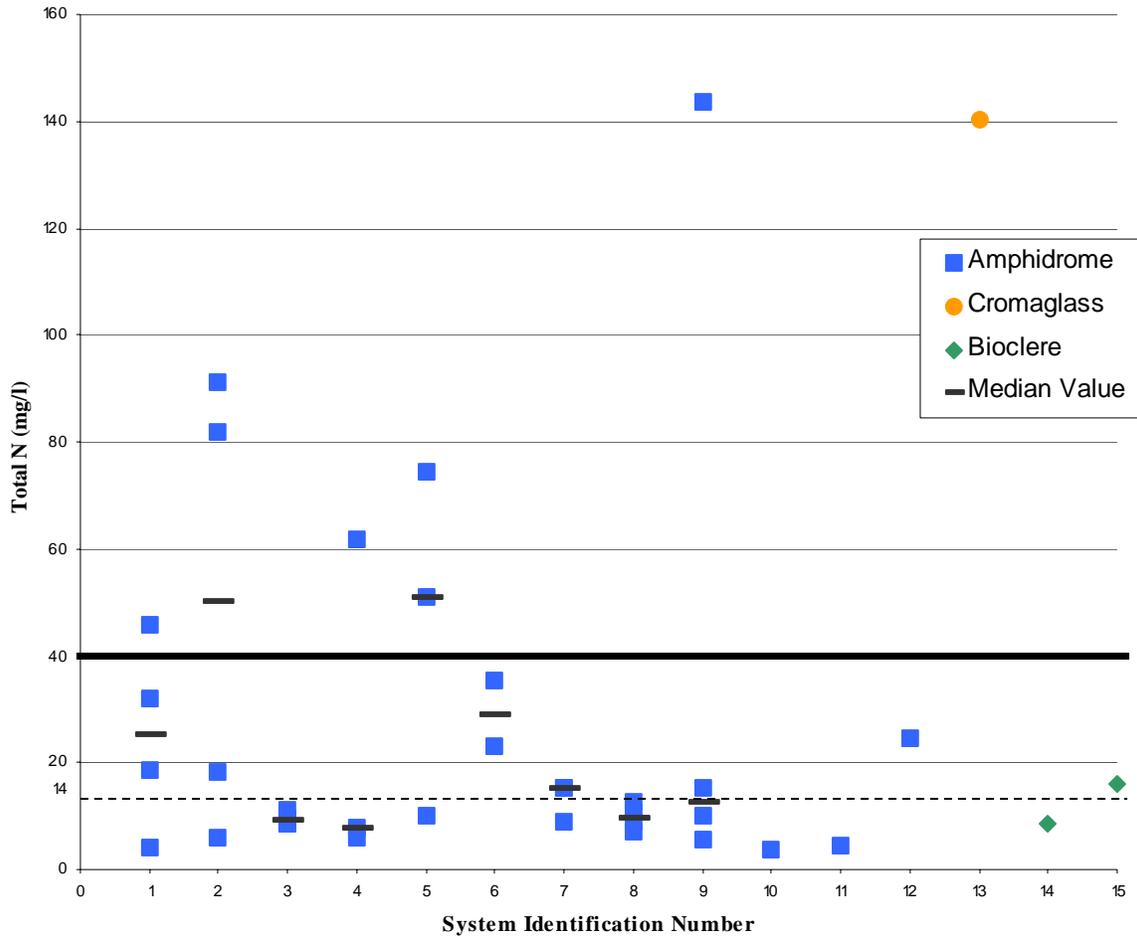
The Table 2 summarizes laboratory results for total nitrogen for all of the systems discussed above. Each system for which analytical results have been submitted is identified by a system identification number, plotted along the x-axis. Individual total nitrogen concentrations from each sampling event are plotted. The median total nitrogen concentration for each system is also shown. Pursuant to the provisions of the pilot program and the Pinelands Septic Dilution Model, total nitrogen concentrations at or below 14 mg/l are required to meet the Pinelands groundwater quality standard of 2 mg/l total nitrogen at the property line of a one acre parcel. Forty (40) mg/l represents the assumed concentration of total nitrogen in untreated domestic wastewater.

It is clear from this limited data set that the concentration of total nitrogen in domestic wastewater frequently exceeds the assumed 40 mg/l concentration. As previously discussed, no conclusions may be drawn from this data relative to the total mass of nitrogen contained in the effluent from these systems as no data for influent volume is available.

Four of the twelve systems have had two or fewer samples analyzed, three of which have had only a single analysis performed. With so few data points available for these systems, no preliminary conclusions are drawn herein. For the remaining eight systems where three or more data points are available, fifty percent (four systems) produced a median value for total nitrogen below the 14 mg/l performance expectation and fifty percent (four systems) produced a median value for total nitrogen greater than the 14 mg/l performance expectation. It should be noted that the alternate design technology vendors are continuing to make process adjustments to those systems that have produced total nitrogen values that do not meet performance expectations and a larger, long term data set is required before any definitive conclusions can be drawn relative to the ability of these systems to meet the groundwater quality objectives of the CMP.

# of samples 4 4 5 3 3 2 3 4 4 1 1 1 1 1 1

**Effluent Nitrogen Concentration Summary**



**Table 2.** Effluent total nitrogen concentration summary.

In developing the amendments to the CMP that established the pilot program, consideration was given to the possibility that the Executive Director might have insufficient data as of August 5, 2006 to determine the success of the pilot program in meeting the objectives of the Commission. The CMP provides a mechanism at N.J.A.C. 7:50-

10.23(c) for the Executive Director to inform the Commission, in a November 5, 2006 report on the pilot program successfulness, that the number of monitoring events for any alternate design pilot program technology is not adequate to evaluate that technology under the pilot program, and upon receiving the Commission's approval, to initiate a second review of the program to be completed by August 5, 2008. Given the limited number of systems that are operating to date and the likelihood that systems will continue to be installed in numbers comparable to those experienced during the past year, it is likely that the Executive Director will find it necessary to exercise the provision at N.J.A.C. 7:50-10.23(c) to request the Commission to extend the pilot program through August 5, 2008.

Home occupancy, water use and cleaning and laundry product usage may vary greatly from one residence to another. These and other variables can markedly impact the concentration of nitrogen in wastewater and can adversely affect the ability of a treatment system to meet established discharge limits. High occupancy within a dwelling can result in abnormally high levels of nitrogen in wastewater given that each person contributes approximately 9 lbs. of nitrogen to the system annually. Water conservation, while certainly desirable, has the potential to result in higher concentrations of pollutants in the wastewater because there is less water available to dilute the pollutants. As a result of significant advances in water conservation, including the use of water conserving fixtures and appliances as well as behavior modifications, assumed values for total nitrogen concentration in domestic effluent, established during the 1960's and 1970's at 40 mg/l, may under predict concentrations present in current domestic wastewater streams. It is important to note however, that the total mass of nitrogen excreted by individuals remains fixed at approximately 9 lbs.. Thus while the concentration of total nitrogen may typically be greater than the assumed value of 40 mg/l, as evidenced in some reported effluent values, the total mass of nitrogen in the wastewater likely remains constant with dilution model assumptions. Even where effluent levels exceed assumed post treatment concentrations, system discharges may still be meeting total nitrogen loading targets.

The three certified treatment technologies that are currently operational in the Pinelands (Amphidrome, Bioclere, and Cromaglass) have an assumed nitrogen removal efficiency of 65%. If the total nitrogen contained in the raw influent is 40 mg/l, a 65% reduction would result in a concentration of 14 mg/l in the treated effluent. Similarly, if influent nitrogen levels are 80 mg/l, the same 65% removal efficiency would result in effluent concentrations of 28 mg/l. It is noteworthy that the pilot program does not provide for the sampling and analysis of raw influent, therefore the percent removal efficiency of the alternate technology systems cannot be calculated at this time. Excessive use of certain cleaning and laundry products as well as the use of certain medications can stress the bacteria that provide biological nitrification and denitrification. Because of this, education of system users is an important component of any wastewater management program.

In recognition of these factors, all of the alternative treatment system vendors have developed homeowner user manuals which provide critical information to the owners of the alternative treatment systems. In addition, several vendors have developed questionnaires which they've provided to system users which are aimed at identifying laundry and cleaning product usage and any other condition which might lead to non-compliant sample results. Staff will recommend that all of the technology vendors collect and analyze this type of information to better understand user characteristics and to enhance compliance with effluent discharge limits.

### **Other Issues in 2005**

On February 18, 2005, the New Jersey Builders Association filed with the Commission a petition to amend the provision of the CMP, at N.J.A.C. 7:50-10.22(a)6 which limits the number of alternate design pilot program systems utilizing the same technology to no more than ten, in the development of any parcel, if those systems each serve one single family dwelling. This CMP provision was imposed for two principal reasons, the first of which was to minimize localized degradation of water quality if a particular technology does not achieve the level of nitrogen

reduction anticipated under the pilot program. Secondly, but of equal importance, was the Commission's desire to encourage the use of community systems in developments that involve multiple dwelling units.

After a detailed analysis by Commission staff of NJDEP regulations governing the approval and use of community treatment systems, the Executive Director concluded that the ten unit limitation had the potential to subject property owners and applicants to a difficult, cumbersome, and time consuming process with no predictable outcome in seeking regulatory approval of a community wastewater treatment system. Based upon the Executive Director's conclusion, the Commission adopted Resolution no. PC4-05-39 on June 10, 2005 to approve with modifications the Petition of the New Jersey Builders Association to amend the CMP and to authorize the Executive Director to propose an amendment to the CMP to modify the ten unit limitation. At the time this report was being drafted, Commission staff had developed proposed amendments that would authorize the Executive Director, in certain instances, to make a determination that the use of additional systems on a parcel would not substantially alter the character of the certified zoning plan and to permit the additional lots to be served proportionately by the alternate design pilot program technologies which have been certified by the Executive Director.

One of the greater challenges to meeting the water quality standards of the CMP will be the development of a long term program to address the continued approval, use and maintenance of advanced onsite treatment technologies. To achieve this goal, a long term septic system management program must commence prior to the conclusion of this five year pilot program. Only through such a program can we ensure the long-term maintenance and monitoring of the alternative technologies. In the absence of a septic system management program, the ability to permit unsewered residential development on lots between one and three acres may be jeopardized. Absent a meaningful management program, rezoning of these parcels would likely be necessary. Moreover, the management of existing conventional systems, as currently required in the CMP would also be addressed as would the development of a much needed septic system Best Management Practices Manual. To this end, the Commission submitted a request to the NJDEP Division of Watershed Management for grant funding to allow the Commission to assist local government entities in the establishment of institutional arrangements for the long term management of onsite wastewater treatment systems. The Department, in recognition of the importance of long term management of onsite wastewater systems, has agreed to provide the Commission with a \$250,000 grant to assist local entities meet this challenge. The long term management program, identified informally as Phase II Septic System Management, will be completed by the Commission as a result of the DEP's funding over the upcoming three year period.

### **Next Steps**

Commission staff will continue to work with the local government officials, especially the Pinelands area health officials and construction code officials to achieve the objectives of the pilot program and assure required documentation is received prior to the issuance of construction approvals and certificates of occupancy. In addition, Commission staff will continue to work with the alternate design treatment systems technology vendors and their agents to assure adherence to the requisite sampling, analysis and reporting requirements of the pilot program.

Further, in an effort to expand the number of treatment system choices available to Pinelands residential applicants, staff will continue to research similar technologies and may return to the Commission in the future to recommend new rule making to allow the introduction of additional technologies to the pilot program. Several alternative systems are undergoing evaluation in other technology demonstration projects and preliminary results indicate that some of these systems, if used on appropriately sized lots, may also meet the water quality requirements of the CMP. A likely benefit to introducing additional proven technologies may be lower system costs resulting from increased competition among the approved technology vendors.

The existing pilot program is limited to residential development because the Pinelands Ad Hoc Septic System

Committee determined that insufficient data were available to establish specific nitrogen removal efficiencies for the highly variable characteristics of non-residential (commercial and institutional) wastewater. The CMP allows non-residential applicants to propose to use an advanced treatment system (in lieu of dilution based upon parcel size) only on a case by case basis. Many Pinelands towns and villages could benefit from the use of alternative treatment technologies by commercial establishments. Although the Commission staff remains ready to assist municipalities explore the use of “community” systems to serve multiple residential and commercial buildings, the Commission may wish at some future point to authorize advanced technologies for individual commercial uses as part of a closely monitored pilot program.

All advanced treatment systems require a higher level of maintenance to achieve optimum treatment efficiencies as compared to standard septic systems. Because of this, the CMP specifies that municipalities will be encouraged to allow community treatment systems to be installed in larger residential developments where densities between one and 3.2 acres are currently authorized. However, experience indicates that developers are frequently disinclined to propose a community treatment system because of delays in acquiring the necessary wastewater management plan amendments. Greater use of community treatment systems might be achieved if an expedited process for wastewater management plan amendments in the Pinelands could be developed.